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NASA Procedural Requirements

COMPLIANCE IS MANDATORY**NPR 7150.2A**Effective Date:
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Request Notification of Change

(NASA Only)

Subject: NASA Software Engineering Requirements

Responsible Office: Office of the Chief Engineer[| TOC](#) | [Preface](#) | [Chapter1](#) | [Chapter2](#) | [Chapter3](#) | [Chapter4](#) | [Chapter5](#) |
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Chapter 6: Tailoring, Engineering Technical Authority, and Compliance Measurement

This NPR provides software engineering requirements to be applied throughout NASA and its contractor community. To accommodate the wide variety of software systems and subsystems, application of these requirements to specific projects will be evaluated and implemented for each project, with alternate acceptable requirements being applied where justified and approved. To effectively maintain control over the application of requirements in this NPR and to ensure proposed variants from specific requirements are appropriately mitigated, NASA has established an Engineering Technical Authority. Waivers and deviations from requirements in this NPR are governed by the following requirements as well as ones established in NPD 1000.3 and NPR 7120.5 for all of the Agency's investment areas. The Engineering Technical Authority (i.e., NASA Headquarters Chief Engineer, Center Director, or designee) for each requirement in this NPR is documented in the last column of Appendix D: Requirements Mapping Matrix. NASA Headquarters' Chief, Safety and Mission Assurance has co-approval on any waiver or deviation decided at the Headquarters level that involves safety-critical software. NASA Headquarters Chief Medical Officer has co-approval on any waiver or deviation decided at the Headquarters level that involves software with health and medical implications. Waivers and deviations decided at the Center level are to follow similar protocol when software safety critical or health and medical issues are involved.

6.1 Tailoring of Requirements

NASA Centers are expected to establish rigorous software engineering practices for software developed or acquired by projects managed at those Centers. In cases where

these Center practices are formal, enforced, and meet or exceed the requirements of this NPR, the requirements allocated to "projects" in this NPR and the data items in Chapter 5 can be replaced by specific Center-level requirements approved by the designated Engineering Technical Authority.

6.1.1 For those cases in which a Center or project desires a general exclusion from requirement(s) in this NPR or desires to generically apply specific alternate requirements that do not meet or exceed the requirements of this NPR, the requester shall submit a waiver for those exclusions or alternate requirements for approval by the NASA Headquarters' Chief Engineer with appropriate justification. [SWE-120]

Note: This type of waiver (which is approved by the NASA Headquarters' Chief Engineer) is for generic/blanket relief from a requirement for a Center, Center organization, or multiple projects over an extended time. Generic/blanket waivers are not to be confused with normal waivers that address relief from a requirement on a single project or in a specific instance (which can be approved at the Center level if so specified in last column of Appendix D).

6.1.2 Where approved, the requesting Center or project shall document the approved alternate requirement in the procedure controlling the development, acquisition, and/ or deployment of the affected software. [SWE-121]

6.2 Designation of Engineering Technical Authority(s)

6.2.1 The designated Engineering Technical Authority(s) for requirements in this NPR, which can be waived at the Center level, shall be approved by the Center Director. [SWE-122]

Note: The designated Engineering Technical Authority(s) for this NPR is a recognized NASA software engineering expert. Typically, Center Directors designate an Engineering Technical Authority for software from their engineering organization for software classes A through E, from the NASA Headquarters' Office of the Chief Information Officer (CIO) for Class F, and from their Center CIO organization for classes G through H. The designation of Engineering Technical Authority(s) is documented in the Center Technical Authority Implementation Plan. Please refer to Appendix D (last column) for requirements that can be waived at the Center level.

[Requirement number SWE-123 is reserved]

6.3 Compliance

6.3.1 The designated Center Engineering Technical Authority(s) for this NPR shall comply with NASA Headquarters' Office of the Chief Engineer's direction on roles and responsibilities for Engineering Technical Authority. [SWE-124]

Note: Top-level direction on Engineering Technical Authority for all of the Agency's investment areas (including activities performed under NPR 7120.7 and NPR 7120.8) is documented in NPR 7120.5 and elaborated for software in this NPR.

6.3.2 Each project with software components shall maintain a compliance matrix against requirements in this NPR, including those delegated to other parties or accomplished by contract vehicles. [SWE-125]

Note: The compliance matrix documents the requirements that the project plans to meet

and any approved waivers or deviations. The compliance matrix and compliance matrix updates should be submitted to the designated Center level Engineering Technical Authority for their records.

6.3.3 The Engineering Technical Authority(s) for this NPR shall consider the following information when assessing waivers and deviations from requirements in this NPR: [SWE-126]

- a. The NASA software inventory data on the project.
- b. The classification of systems and subsystems containing software, as defined in Appendix E.
- c. Applicable Center-level software directives that meet the intent of this NPR.
- d. Applicable contractor and subcontractor software policies and procedures that meet the intent of this NPR.
- e. Potential impacts to NASA missions.
- f. Potential impacts to health, medical concerns, or safety.

6.3.4 Centers and projects shall fully comply with the "shall" statements in this NPR that are marked with an "X" in Appendix D consistent with their software classification. [SWE-139]

Note: If the requirement is marked with a "SO" in appendix D, the project is required to meet the requirement to the extent necessary to satisfy the safety critical aspects of the software.

6.3.5 When the requirement and software class are marked with a "P (Center)," Centers and projects shall meet the requirement with an approved non-null subset of the "shall" statement (or approved alternate) for that specific requirement. [SWE 140]

Note: The use of partial Center (i.e., "P (Center)") requirements allows for local adaptations to suit Center and application unique needs. Although the NASA Headquarters' Office of the Chief Engineer is the review and concurrence authority for the Center defined "P (Center)" requirements, this approval does not constitute a deviation nor a waiver. The project or Center is responsible for flowing down all applicable NPR 7150.2 requirements, including "P (Center)" requirements, to contracted software development activities. "P (Center)" requirements are typically documented in Center-level directives.

6.3.6 The NASA Headquarters' Office of the Chief Engineer shall review and have concurrence approval when a Center defines subsets of requirements denoted by "P (Center)" in the Requirements Mapping Matrix in Appendix D for the indicated classes of software. [SWE-127]

6.3.7 The Center-level Engineering Technical Authority shall keep records of projects' compliance matrices, waivers, and deviations against this NPR. [SWE-128]

6.3.8 The NASA Headquarters' Office of the Chief Engineer shall authorize appraisals against selected requirements in this NPR (including NASA Headquarters' Office of the Chief Engineer approved subsets and alternative sets of requirements) to check compliance. [SWE-129]

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